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Salmonella on U.S. Beef Cow-calf Operations, 2007–08

Salmonella bacteria have been isolated from nearly all vertebrates, and *Salmonella* infections have been associated with both animal and human disease. Typical signs of *Salmonella* infection in cattle and humans include fever and diarrhea. Severe cases can result in death.

Shedding of *Salmonella* bacteria in cattle often occurs in the absence of clinical signs, sometimes for extended periods. In some cases, foods of animal origin have been implicated as the source of human illness caused by *Salmonella*. Salmonellosis in humans is typically self-limiting and most people recover within 1 week. Antimicrobials are not necessary for treatment of most *Salmonella* infections in humans and animals; however, *Salmonella* resistance to antimicrobials is a concern because it can complicate treatment options in severe infections.

NAHMS Beef 2007–08 study

The U.S. Department of Agriculture's National Animal Health Monitoring System (NAHMS) conducted the Beef 2007–08 study, which focused on beef cow-calf health and management practices in 24 States from three regions of the United States.¹ These States represented 79.6 percent of U.S. operations with beef cows and 87.8 percent of U.S. beef cows.

One objective of the Beef 2007–08 study was to describe the occurrence of *Salmonella* and associated antimicrobial resistance on beef cow-calf operations in the United States. NAHMS also examined *Salmonella* occurrence in adult cows on beef cow-calf operations in its Beef '97 study. For comparison purposes, this information sheet presents data from both studies.

Table 1 presents results from the two NAHMS beef cow-calf studies. For each of the studies, samples were collected from up to 40 fresh fecal pats on the ground. Care was taken to ensure samples originated from adult beef cows.

¹ States/Regions

West: California, Colorado, Idaho, Montana, New Mexico, Oregon, Wyoming

Central: Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota

Southeast: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee, Texas, Virginia

BY:

For the Beef '97 study, samples were taken from 187 beef cow-calf operations; for the Beef 2007–08 study, samples were taken from 173 operations. Results in table 1 indicate little change occurred from 1997 to 2007 in the percentage of positive operations and cows positive for *Salmonella*.

Table 1. Number and Percentage of Operations (and Number and Percentage of Cows Sampled) Positive for *Salmonella*

	Operations with at Least One Positive Cow		Positive Sampled Cows	
	No.	Pct.	No.	Pct.
Beef '97	21/187	11.2	70/5,049	1.4
Beef 2007–08	16/173	9.2	31/5,793	0.5

In the Beef 2007–08 study, the number of *Salmonella*-positive cow-calf operations did not differ substantially by herd size² or by region. Two cow-calf operations tested positive for four different *Salmonella* serotypes, and two different serotypes were present on three operations. On all other positive operations, only a single serotype was identified. *S. Montevideo* was the most common serotype (17.6 percent of isolates [table 2]).

Table 2. Number and Percentage of *Salmonella* Isolates (and Number and Percentage of Positive Operations), by Serotype

Serotype	Isolates* (n=34)		Operations (n=16)	
	No.	Pct.	No.	Pct.
Braenderup	2	5.9	2	12.5
Meleagridis	2	5.9	1	6.3
Montevideo	6	17.6	2	12.5
Newport	2	5.9	2	12.5
I 3,10:-:1,w	2	5.9	1	6.3
I 6,7:k:-	3	8.8	1	6.3
All others**	17	50.0	13	81.3

*More than one isolate was cultured from two samples.

**Three untypable isolates are included here, as well as serotypes with one isolate each (Anatum, Javiana, Lawndale, Mbandaka, Oukam, Rubislaw, Saugas, and seven unnamed serotypes).

²Herd size (Number of Beef Cows): 1-49, 50-99, 100-199, 200 or more.

Salmonella antimicrobial susceptibility

None of the *Salmonella* isolates from the Beef 2007–08 study were resistant to any of the 15 antimicrobials against which they were tested. In the Beef '97 study, only 12.8 percent of the isolates were resistant to at least one antimicrobial (table 3).

Table 3. Percentage of Resistant *Salmonella* Isolates, by Antimicrobial*

Antimicrobial	Percent Isolates	
	Beef '97 (n=78)	Beef 2007–08 (n=34)
Amikacin	0.0	0.0
Amoxicillin-Clavulanic acid	0.0	0.0
Ampicillin	1.3	0.0
Apramycin	0.0	NA
Cefoxitin	NA	0.0
Ceftiofur	0.0	0.0
Ceftriaxone	0.0	0.0
Cephalothin	0.0	NA
Chloramphenicol	0.0	0.0
Ciprofloxacin	0.0	0.0
Gentamicin	2.6	0.0
Kanamycin	0.0	0.0
Nalidixic Acid	0.0	0.0
Streptomycin	11.5	0.0
Sulfamethoxazole**	11.5	0.0
Tetracycline	2.6	0.0
Ticarcillin	1.3	NA
Trimethoprim-Sulfamethoxazole	0.0	0.0
Resistant to two or more antimicrobials	11.5	0.0
Susceptible to all antimicrobials tested**	87.2	100.0

* Intermediate isolates were classified as susceptible.

**Sulfisoxazole replaced Sulfamethoxazole in 2007–08.

NA = antimicrobial not included for this study.

10 percent of operations in each study. Approximately 1 percent of samples were positive for *Salmonella* in Beef '97 and Beef 2007–08. These results suggest that *Salmonella* are not very common on U.S. beef cow-calf operations. It is possible that repeated sampling of these same operations over time could identify more positive operations. Herd size and region of the United States were not associated with the presence of *Salmonella* on operations from the Beef 2007–08 study. Antimicrobial resistance was not observed in any of the *Salmonella* isolates from the Beef 2007–08 study, and very little resistance was seen in isolates from the Beef '97 study. These results suggest that antimicrobial-resistant *Salmonella* are uncommon in U.S. beef cow-calf operations.

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Summary

The percentage of *Salmonella*-positive beef cow-calf operations in the Beef '97 and Beef 2007–08 studies was quite low, with *Salmonella* being found on about